TAXONOMIC NOTES OF THE GENUS *PORTULACA* LINN. IN INDIA[1]

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Geesink (1969, 1971), while revising the genus *Portulaca* Linn., of Indo-Australia and the Pacific has amended the circumscription of the species drastically and considered the genus (formerly believed to include about 200 species) to have not more than 40 'good species'. In this note in accordance with Geesink's concept of species, four species in India are recognised, where formerly 7 species were reported. This paper also attempts to discuss Geesink's concept of infraspecific categories and has made certain deviations for reasons discussed in the text.

Introduction

Portulaca Linn. is a tropical and subtropical 'heliophilous' genus of succulent and semisucculent herbs' with a preference for bare places'. This genus, previously considered to have about 200 species (Santapau & Henry 1973), is of very limited economic importance. *P. pilosa* ssp. *grandiflora* is grown widely as a summer ornamental, while *P. oleracea* is eaten as a vegetable.

von Poellnitz (1934) monographed the genus and recognised 104 species to which about 30 species were added later by subsequent workers. He also proposed a subgeneric classification which was found to be untenable by Geesink (1969), who in turn proposed its subdivision into two subgenera, *viz.* subg. *Portulacella* and subg. *Portulaca*. The former restricted to Australia, exhibits the most primitive inflorescence structure in the genus and hence it is suggested that the ancestral lineage of the genus is found in Australia (Geesink 1969).

The predominently autogamous breeding system has played an active role in isolation and divergence in this genus and has resulted in the emergence of homogenous populations with 'sharp delineations against each other' and constant in their details. This probably prompted the earlier taxonomists to recognise each one of these 'pure-lines' as a distinct species, taking the total number of them as high as 200. The concept of species has however, undergone drastic changes in the recent past. Geesink (1969) has suggested that in the genus there are 'not more than 40 good species'. Consequently, several of Poellnitz's species are lumped together or reduced to subspecific taxa, and some are even considered not deserving any 'systematic recognition as formal taxa'.

This shift in the concept of species and subspecific taxa in this genus has warranted a reconsideration of its Indian species too. The 7 species reported from India (Santapau & Henry 1973), have been reduced to 4 'good species', namely *P. oleracea, P. pilosa, P. quadrifida,* and *P. wightiana.*

While broadly in agreement with Geesink's concept of species in the genus, I find it difficult to accept his treatment of certain 'pure-lines' which were originally described as distinct species, for obvious morphological dis-

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tinctiveness, as 'races' of no taxonomic consequence. Under *P. pilosa* ssp. *pilosa*, he has recognised 6 'races' of which race *pilosa* and race *tuberosa* are represented in India. While the former was considered to be a species by itself the latter included in it two different species namely, *P. tuberosa* and *P. suffruticosa*, as recognised by most systematists. *P. tuberosa* was set apart on account of its tuberous roots, diffuse or prostrate habit and non-tuberculate seeds, while the latter had branched woody roots, suffruticose habit and tuberculate seeds. However, they intergrade so much, that their separation seems to be unjustified even at subspecific levels. Even when one accepts that self-pollination explains the 'profuse occurrence of more or less purelines ...in nature which keep constant details' and that their distinctiveness is governed by only a few genes (Geesink 1969), one doubts the very expediency of keeping such populations out of bounds for the taxonomists, dumping them as 'races' of no formal taxonomic status. The primary task of the taxonomist is to recognise plant groups as they exist in nature and to give names to different plant populations, so that their properties can be recorded, information tabulated and detailed phytogeographical studies made. Even if a species is polymorphic, some grouping of the variants is still necessary if this primary aim is not to be lost sight of (Verdcourt 1970, p. 236).

Morever, the term 'race' has been rather confusing and 'it is worth realising now that the term 'race'.....is seldom found in recent literature.....it is sometimes translated as meaning subspecies and lead to serious problems of interpretation and nomenclature' (Davis & Heywood 1963, p. 100). The International Code of Botanical Nomenclature (1972) also does not recognise 'race' as a formal taxonomic category. So it seems worthwhile, to bring the various groups ('races') under formal taxonomic terminology. I propose varietal rank for the so called 'races' and consequently new combinations are proposed.

KEY TO THE SPECIES AND SUBSPECIFIC TAXA

1. Leaves flat:
   2. Flowers in heads:
      3. Leaves obovate-spathulate ..... *P. oleracea* var. *oleracea*
      3. Leaves linear-oblong, acute..... *p. oleracea* var. *linearifolia*
   2. Flowers solitary:
      4. Leaves concealed by scales ..... *P. wightiana*
      4. Leaves not concealed by scales..... *P. quadrifida*
1. Leaves linear, terete or subterete:
   5. Flowers small, less than 2 cm across..... *P. pilosa* ssp. *pilosa*
      6. Flowers pink.....var. *pilosa*
      6. Flowers yellow.....var. *tuberosa*
   5. Flowers large, 4-5 cm across..... *P. pilosa* ssp. *grandiflora*

SYSTEMATIC TREATMENT

P. oleracea Linn. Sp. Pl. 445. 1753; Dyer in Hook. f. Fl. Brit. Ind. 1: 247. 1874; Cooke, Fl. Pres. Bomb. 172. 1901; Gamb. Fl. Pres. Madr. 66. 1915; Poelln. in Fedde Rep. 37: 258. 1934; Geesink in Blumea 17: 292. 1969 & Fl. Males. 7: 129. 1971; Khoshoo & Singh in Bull. Bot. Surv. Ind. 8 : 278-286. 1966.

var. **oleracea :**

Leaves fleshy, obovate-cuneate, truncate, obtuse or retuse at tips, up to 2×1 cm in size; flowers bright yellow (Hiralal 15969, Lucknow is recorded to have white flowers) crowded at the tips of branches; capsules ovate-acute 7-8 mm long; seeds 20-25 in each capsule, minute, shining black, tubercled.

Specimens examined:

Andamans: Bhargava 2384, 1802. Balakrishnan 57. Thothathri 10800. *Andhra Pradesh*:

Sebastine 5982, Narayana Swami 145; Thothathri 9679; Balakrishnan 1147; Krishanan Sn. 80380 (Cuddapah), Murty 137 (Waltair). *Arunachal*: A. S. Rao 48156 (NEFA); Joseph 48445 (NEFA); Hare 1898 (NEFA); Bor 1118 (Aka Hills). *Assam*: Mann (Sn. 43688; Craib 277; Panigrahi 14332; R. S. Rao 9906; Gill 43; Nath 13360; Masters 44; Srivastava 79919 (Jorhat); Nayar 51247 (Kamrup); Panigrahi 11417; Verma 41770 & 46545; Joseph 38205; (Nongpoh) Beb 35192. *Bihar*: Prain Sn. 43682 (Ranchi), Shetty 227 (Champaran), Srivastava 46611 (Patna). *Gujarat*: Rao 1911; Kaul 9188 (Girmar). *Goa*: Eradi 2421 (Panaji). *Jammu & Kashmir*: Saran 39900, 29869; Vohra & Wadhwa 767. *Karnataka*: A. S. Rao, 80243. *Kerala*: Sivarajan 633, & 1309 (Calicut); Calder & Narayana Swami 1568. *Madhya Pradesh*: Kaul 5366 (Machaghat); *Maharashtra*: Santapau 283 (Bombay), Saran 61524 (Lonavala), Patil 2349 (Patil has recorded that 'the plant is useful in Scurvy and liver diseases. The juice of the stem applied to prickly heat and to hands and feet where burning sensation is felt'). King 227, Wadhwa 64309 & 68656, Billore 116213. *Manipur*: Deb 343. *Meghalaya*: Deb 29253 (Garo Hills); Sharma 18674 (Khasi & Jaintia Hills), Deka 1647 (Khasi & Jaintia Hills). *Orissa*: Panigrahi 23828 & 8516, Raju 7521, Panigrahi 23468; Saran 58609, G. V. S. Rao 30403. *Punjab*: Kaul 22995 (Jullundur). *Rajasthan*: Nanteyal 25428 (Jodhpur), Singh 3243; Verma 588; Singh 319. *Tamil Nadu*: Sebastine 186 & 580. *Tripura*: Debbarnian 290 (Agartala), *Uttar Pradesh*: Bell 180; T. A. Rao, 11633; Mackinnon Sn. 43669: Misra 9783; Srivastava 24600 (Lucknow), Hiralal 15969 (Lucknow); Duthie 6331 (Itawah), 43201 (D. Dun), Saxena 1989 (Mussoorie), Ashraf Alam 72012 (Rai Bareli); *West Bengal*: Ghosh, Mukherjee 5331 & 5947 (Howrah).

var. **linearifolia** Sivarajan et Manilal, New Botanist 4: 30. 1977.

This variety differs from *P. oleracea* var. *oleracea* in having linear leaves and 55-75 seeds in each capsule which are much smaller than those of the latter.

Ecology: In fields and gardens along with the typical form of the species mainly in N. India. This has been reported from U.P., Punjab, Bihar, Maharashtra and Gujarat.

Specimens examined:

Bihar: Srivastava 46612 (Patna). *Rajasthan*: Singh 3213. Sharma 477; Roy 2163; Shetty 3312, 1848. *Uttar Pradesh*: Coll. ? Sn. 43671 records that it is "cultivated form known as 'Kulfa Sag' and eaten as pot herb in United provinces" Nair 14739; Chandra 42790 (Sahranpur—type), Coll. ? Sn. 146 (Kanpur), Kapoor 18891 (Lucknow), Hiralal 15970 (Lucknow), Kaul 47601 (Allahabad), Saran 26628 (Lakhimpur Kheri), *Delhi*: Kaul 8317, *Locality*: ? Royle Sn. 43703, Gustavmann 52, *W. Bengal*: Chatterjee 90 (Purulia), *Assam*: Kurz. Sn. 43687, *Orissa*: Panigarhi 8276.

P. wightiana Wall. (Cat. 6842. 1828, nomen.) *ex* Wt. & Arn. Prod. 356. 1834; Dyer *l.c.* 247; Cooke, *l.c.* 72. Gamb. *l.c.* 314; Poelln. *l.c.* 314; Geesink *l.c.* 290. 1969.

Branched, prostrate herbs, branches angled, jointed; leaves fleshy, ovate-acute, nodal appendages silvery white; flowers terminal, solitary, sessile; capsule globular, operculum straw coloured.

Ecology: A heliophilous semisucculent herb common along the sandy sea coast, chiefly along the eastern coast of S. India.

Specimens examined:

Andhra Pradesh: Fischer 4341 (Chittoor Dt.). *Tamil Nadu*: King Sn. ? Fischer 2154 (Coimbatore), Gamble 17771 (Bellary), Lawson Sn. 2.

P. quadrifida Linn. Mant. Pl. 1 : 73. 1767; Dyer *l.c.* 246; Cooke *l.c.* 72; Gamb. *l.c.*, poelln. *l.c.* 275; Geesink *l.c.* & Fl. Males. 7:127. 1971. *P. meridiana* Linn. f. suppl. Sp. Pl. 248. 1781. *P. geniculata* Royle, Ill. Bot. Himal. I:221. 1839, *nomen.*

Diffuse or prostrate herbs, rooting at nodes with fleshy ovate or elliptic, acute leaves up to 6×3 mm; nodal hairs silvery white; flowers yellow, solitary; capsules conical, 5 mm long; seeds black, tubercled.

Ecology: In moist grasslands, garden premises, waste places and railway embankments. Quite variable in their hairiness.

Specimens examined.

Andhra Pradesh: Murty 1881 (Waltair), Thothathri 9678; Balakrishnan 1157. *Bihar*: Srivastava 46737. Banerjee 316. *Gujarat*: Deo 14293 (Somnath), Srivastava 14223. *Kerala*: Lawson 328 & 329. *Maharashtra*: Rao 2309 & 2214. *Madhya Pradesh*: Kaul 18142. *Orissa:* Srivastava 93905 (Puri), Abraham 33 & 280; Mukherjee 6065, Annandale 1216. *Punjab*: Aitchison 1024. *Rajasthan*: Hiralal 34425 (Alwar), Raizada 23763 (Rajkot), Tiwari 1124; Duthie 4520. *Uttar Pradesh*: Hiralal 15971 (Lucknow), Kohli 44521 (Meerut), Ratanlal Sn.? (Dehra Dun), Arora 4793 & 3882. *Tamil Nadu*: Lawson 328 (Cape comorin), Sebastine 8308 & 673, Fisher 122; Perottet 422, Subramanyam 141 & 829; Wight Sn. 43716.

P. pilosa Linn. Sp. Pl. 445. 1753; DC. Prod. 3:354. 1828. Poelln. in Fedde, Rep. 37:261. 1934; Bailey, Man. Cult. Pl. 365. 1949; Geesink in Blumea 17: 294. 1969.

Leaves spiral, with conspicuous axillary hairs, capituli 1-12 flowered; flowers surrounded by membraneous bracteoles and hairs; capsules ovate or obovate.

Tropics, some are grown as ornamentals and very often escape cultivation.

ssp. **pilosa:** Geesink in Blumea 17 : 295-97. 1969.

Leaves usually linear-acute, subterete; flowers yellow or pink, crowded in 2- many flowered heads; fruit globose.

var. **pilosa :**

P. pilosa sensu Poelln. *l.c.* 261; Bailey, Man. Cult. Pl. 365. 1949. *P. pilosa*, ssp. *pilosa*, 'race' *pilosa*' Geensink in Blumea 17: 94. 1969 & Fl. Males. 7: 131. 1971.

Herbs with linear, subterete leaves and pink flowers, roots not tuberous; capsules globose, 2-3 mm across; testa cells elliptic stellate, tubercled.

Ecology: on bare rocky laterite and sandy beaches.

Specimens examined:

Andhra Pradesh: Balakrishnan 1102. *Bihar*: Panigrahi 11697. *Kerala*: Nair 19090. *Rajasthan*: Shetty 1249, Wadhwa 8370. *Uttar Pradesh* Prasad 327. *West Bengal*: Dutt 478, Nuskar Sn. 43739.

var. **tuberosa** (Roxb.) Sivarajan, Stat. nov. *P. tuberosa* Roxb. Fl. Ind. (ed. Carey) 2:464. 1832; Dyer, *l.c.* 246; Cook, *l.c.* 73; Gamb. *l.c.*; Poelln. *l.c.* 312. *P. suffruticosa* Wall. (Cat. 6844. 1832, *nomen. nud.*) *ex* Wt. & Arn. Prod. 356. 1834; Dyer *l.c.* 247; Cooke, *l.c.*, Gamb. *l.c.*, Poelln. *l.c.* 313; *P. pilosa*, ssp. *pilosa*, (race '*tuberosa*') Geesink in Blumea 17: 296. 1969 & in Fl. Males. 7: 131. 1971.

A semisucculent herb with tuberous or woody much branched roots, leaves subterete, linear-acute, axillary hairs short; flowers usually solitary; seeds usually tubercled.

Ecology: On wet, moist rocky laterite and sandy sea coasts.

Studies on herbarium materials and in the field have shown that there are a number of intermediates between *P. tuberosa* Roxb. and

P. suffruticosa Wall. *ex* Wt. & Arn. making a distinction very difficult.

Specimens examined:

Andhra Pradesh: (Waltair) Murty 189, (Hyderabad) Kaul 4696. *Bihar*: Mukherjee 4454; *Kerala*: (Calicut) Sivarajan 1169, 1170; *Laccadives*: Coll.? Sn. 43712. *Maharashtra*: Wadhwa 69863; *Orissa*: Abraham 263, Rao 5977. *Punjab*: Ramlakhan 9717, Kaul Sn. 29715 (Jullundur). *Rajasthan*: (Ajmir) Sharma 100288; *Tamil Nadu*: Rao 1434, Majeed 15504 (Courtallam); *Uttar Pradesh*: (Kukrail forests) Umashankar 1010, (Unnao) Kanjilal, Sn. 96816, Prasad, 328, 329.

P. pilosa ssp. **grandiflora** (Hook.) Geesink in Blumea 17: 297. 1969 & in Fl. Males. 7: 131. 1971. *P. grandiflora* Hook. Bot. Mag. n.s. 2. t. 2885. 1829, Poelln. *l.c.* 264.

Diffuse succulent herbs with linear, subterete leaves, and axillary hairs up to 5 mm long; flowers 3-4 cm across, in clusters of 4-6, sessile, colour variable; capsules subglobose.

Specimens examined:

Kerala: Sivarajan 1725 (Calicut). *Tripura*: Deb 267 & 2198. *Uttar Pradesh*: Kapoor 20405 (Lucknow), Umashankar 3590. Sn. 149, 150 (Kanpur), Rajkumar Sn. 37387 (Nainital); *W. Bengal*: Coll.? Sn. 43741.

Note: This tropical American taxon very widely cultivated throughout India falls under two categories.

1. Annuals—Solely propagated by seeds.
2. Perennials—those that do not set seeds and are propagated vegetatively.

Since, basically the species is an annual, the perennial nature might have been produced as a result of constant human selection to prefer certain cultivars, which otherwise breakdown and segregate.

Several cultivars, chiefly distinguished by their flower colours and numbers of petals are under cultivation. Genetic experiments have shown that the double flowered form is conditioned by a dominent allele (Yasui 1920). Katsuyoshi and Harding (1969) have also demonstrated the genetic varibility of petal length, width and number in commercial populations of this taxon. All flower colours and form variations are found to be differences in the genic level, but for one cultivar, 'jewel' which has a chromosome number n = 5, while the basic number of this taxon is n = 9 (Sultana Rizvi *et al.* 1972).

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